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मानक

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“Step Out From the Old to the New”

IS 15355 (2003): Rubber Hose and Hose Assemblies for Liquefied Petroleum Gas in Motor Vehicles [PCD 13: Rubber and Rubber Products]



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Bhartrhari—Nitiśatakam

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द्रवित पेट्रोलियम गैस (एल पी जी) मोटर वाहनों के लिए
रबड़ हौज़ और हौज़ समुच्चय — विशिष्टि

Indian Standard

**RUBBER HOSE AND HOSE ASSEMBLIES
FOR LIQUEFIED PETROLEUM GAS IN MOTOR
VEHICLES — SPECIFICATION**

ICS 43.060.40;83.140.00

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

NATIONAL FOREWORD

This Indian Standard is identical with ISO 8789 : 1994 'Rubber hoses and hose assemblies for liquefied petroleum gas in motor vehicles — Specification' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Rubber and Rubber Products Sectional Committee and approval of the Petroleum, Coal and Related Products Division Council.

The text of ISO Standard has been proposed to be approved as suitable for publication as Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated. However, that International Standard cross-referred in this adopted ISO Standard which has subsequently been revised, position in respect of latest ISO Standard has been given:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 37 : 1994 Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties	IS 3400 (Part 1) : 1987 Methods of test for vulcanized rubber : Part 1 Tensile stress-strain properties (<i>second revision</i>)	Technically equivalent with minor deviation
ISO 188 : 1982 Rubber, vulcanized — Accelerated ageing or heat-resistance tests	IS 3400 (Part 4) : 1987 Methods of test for vulcanized rubber : Part 4 Accelerated ageing (<i>second revision</i>)	do
ISO 471 : ¹⁾ Rubber — Times, temperatures and humidities for conditioning and testing	IS 13867 : 1993 Rubber standard temperatures, humidities and times for the conditioning and time interval between vulcanization and testing of test pieces	do
ISO 1402 : ²⁾ Rubber and plastics hoses and hose assemblies — Hydrostatic testing	IS 443 : 1975 Methods of test for sampling and test for rubber hoses (<i>second revision</i>)	do
ISO 1817 : 1985 Rubber, vulcanized — Determination of the effect of liquids	IS 3400 (Part 6) : 1983 Methods of test for vulcanized rubber : Part 6 Resistance to liquids (<i>first revision</i>)	do

¹⁾ To be published (Revision of ISO 471 : 1983 and ISO 1826 : 1981).

²⁾ To be published (Revision of ISO 1402 : 1984).

Indian Standard

RUBBER HOSE AND HOSE ASSEMBLIES FOR LIQUEFIED PETROLEUM GAS IN MOTOR VEHICLES — SPECIFICATION

1 Scope

This International Standard specifies the requirements for rubber hoses and hose assemblies, up to a maximum bore of 20 mm, for use in motor vehicles with liquefied petroleum gas (LPG) installations. The hoses are designed for use up to a maximum pressure of 2,5 MPa (25 bar) and a working temperature between - 40 °C and + 80 °C.

NOTE 1 If hoses are used at temperatures higher than 80 °C, i.e. in an engine compartment and/or as connecting hoses with exhaust-pins (used by air-cooled engines for the evaporation of the gas) it will have to be shown that these hoses can withstand the higher temperatures.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 37:1994, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties.*

ISO 188:1982, *Rubber, vulcanized — Accelerated ageing or heat-resistance tests.*

ISO 471:—¹⁾, *Rubber — Times, temperatures and humidities for conditioning and testing.*

ISO 1402:—²⁾, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing.*

ISO 1817:1985, *Rubber, vulcanized — Determination of the effect of liquids.*

ISO 4080:1991, *Rubber and plastics hoses and hose assemblies — Determination of permeability to gas.*

ISO 4672:1988, *Rubber and plastics hoses — Sub-ambient temperature flexibility tests.*

ISO 6803:1994, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing.*

ISO 7326:1991, *Rubber and plastics hoses — Assessment of ozone resistance under static conditions.*

3 Bore diameters and tolerances

Bore diameters and tolerances shall comply with the requirements in table 1.

Table 1 — Bore diameters and tolerances

Dimensions in millimetres

Nominal bore	Tolerances	
6,4	- 0,6	+0,2
9,5	- 0,6	+0,2
12,7	- 0,8	+0,4
15,8	- 0,8	+0,4
19,0	- 0,8	+0,8

1) To be published. (Revision of ISO 471:1983 and ISO 1826:1981)

2) To be published. (Revision of ISO 1402:1984)

4 Hose construction

4.1 The hose shall consist of a smooth bore lining and cover of suitable rubber material, reinforced with one or more interlayers.

4.2 The cover and lining shall be smooth and free from visible defects and contamination.

4.3 If corrosion-resistant material (i.e. stainless steel) is used for the reinforcement, no cover is required.

4.4 Reinforcement may be by cotton, synthetic fibre or corrosion-resistant material (i.e. stainless steel). Reinforcement materials which are not corrosion-resistant will require additional protection against the external environment.

NOTE 2 National safety regulations may define the type of reinforcement to be used.

4.5 To avoid the formation of bubbles due to gas permeation, the cover shall be pin-pricked.

4.6 The construction of the hose shall be such that it is not necessary to peel back the cover before mounting the fitting.

5 Requirements for lining and cover material

5.1 Preparation of test pieces

Test pieces shall be taken from the hose. No tests shall be carried out within 24 h after manufacture of the hose.

5.2 Physical requirements for the lining and the cover

When tested in accordance with the methods of test indicated in table 2, the lining and the cover shall comply with the requirements specified.

5.3 Resistance to *n*-pentane

When tested in accordance with the methods of test indicated in table 3, a test piece of the lining and cover, immersed in *n*-pentane for 72 h at standard temperature in accordance with ISO 471, shall comply with the requirements specified.

5.4 Ozone resistance

When tested in accordance with ISO 7326:1991, method 3, a test piece of the cover, or complete hose in the case of tubing reinforced with corrosion-resistant material, shall show no visible cracks.

Table 2 — Physical requirements for lining and cover

Property	Requirement	Method of test
Tensile strength (MPa)	7,0 min.	ISO 37
Elongation at break (%)	150 min.	ISO 37
Accelerated ageing: 72 h at 100 °C		ISO 188
Change in tensile strength (%)	-25 max.	ISO 37
Change in elongation at break (%)	(-50 to +10) max.	ISO 37

Table 3 — Resistance to *n*-pentane

Property	Requirement	Method of test
Change in tensile strength (%)	-35 max.	ISO 37
Change in elongation at break (%)	-35 max.	ISO 37
Change in volume (%)	(-10 to +30) max.	ISO 1817

6 Requirements for hoses

6.1 Permeability to gas

When tested in accordance with method 3 of ISO 4080:1991, the permeability to propane shall not exceed $0,0528 \text{ cm}^3/\text{m}^2/\text{s}$, calculated as permeation through the exposed lining area.

6.2 Low-temperature resistance

No cracks or ruptures shall be visible in the cover or lining when tested at $-40 \text{ }^\circ\text{C}$ in accordance with method B of ISO 4672:1988.

6.3 Hydrostatic proof pressure and minimum burst pressure

6.3.1 The hose shall be designed for a maximum working pressure of 2,5 MPa (25 bar).

6.3.2 No leaks or signs of failure shall occur when a proof test pressure of 6,25 MPa (62,5 bar) is applied to the hose in accordance with ISO 1402, except that the proof pressure shall be held for a period of 10 min.

6.3.3 When tested in accordance with ISO 1402, the minimum burst pressure shall not be less than 12,5 MPa (125 bar).

7 Requirements for fittings

7.1 The fittings shall be made of stainless steel, brass or plated ferrous material to prevent corrosion.

7.2 Fittings of the crimp-on type or the screw-together reusable type shall be used. The swivel nut shall be provided with a UNF thread, and sealing shall be by means of a 45° cone.

NOTE 3 Material specifications and type of fitting may be affected by national safety regulations.

8 Requirements for hose assemblies

8.1 Impulse testing

8.1.1 After treatment in accordance with 8.1.2, the assembly shall withstand a proof test as described in 6.3.2.

8.1.2 Subject the hose assembly to an impulse test in accordance with ISO 6803. The test shall be performed with circulating oil at $93 \text{ }^\circ\text{C}$ and at a minimum pressure of 2,5 MPa (25 bar) for 150 000 impulses.

8.2 Gastightness

After application, using nitrogen gas, of an internal pressure of 3,0 MPa to the test assembly, the assembly shall not show any leak when submerged in water for 5 min.

9 Marking

9.1 Hoses complying with this International Standard shall be legibly and indelibly marked, at intervals of not greater than 0,5 m, with the following:

- a) the manufacturer's name or trade-mark;
- b) the quarter and year of manufacture;
- c) the size and type of hose;
- d) the number of this International Standard;
- e) the identification "LPG".

9.2 Hose assemblies shall bear the name or trade-mark of the assembling manufacturer, and the thread size.

(Continued from second cover)

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 4080 : 1991 Rubber and plastics hoses and hose assemblies — Determination of permeability to gas	Nil	—
ISO 4672 : 1988 Rubber and plastics hoses — Sub-ambient temperature flexibility tests	Nil	—
ISO 6803 : 1994 Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing	Nil	—
ISO 7326 : 1991 Rubber and plastics hoses — Assessment of ozone resistance under static conditions	Nil	—

In case of ISO 4080 : 1991, ISO 4672 : 1988, ISO 6803 : 1994 and ISO 7326 : 1991 the Committee, responsible for the preparation of this standard took cognizance of these standards and decided that they are acceptable for use in conjunction with this standard.

For tropical countries like India, the standard temperature and the relative humidity shall be taken as $27 \pm 2^{\circ}\text{C}$ and 65 ± 5 percent respectively.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

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Amendments Issued Since Publication

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
Telephones : 2323 0131, 2323 3375, 2323 9402

Telegrams: Manaksanstha
(Common to all offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110 002

Telephone

{ 2323 7617
2323 3841

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Kankurgachi
KOLKATA 700 054

{ 2337 8499, 2337 8561
2337 8626, 2337 9120

Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160 022

{ 60 3843
60 9285

Southern : C. I. T. Campus, IV Cross Road, CHENNAI 600 113

{ 2254 1216, 2254 1442
2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400 093

{ 2832 9295, 2832 7858
2832 7891, 2832 7892

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